

Claims

1. An induction bonding apparatus comprising:

a first induction heating plate comprising one or more first induction coils disposed within
5 a heat resistant material;

a second induction heating plate comprising one or more second induction coils disposed
within a heat resistant material; and

a frame disposed around the second induction heating plate, the frame comprising one or
more third induction heating coils disposed within a heat resistant material;

10 whereby placing an electrically conductive sheet on a surface of the first induction heating plate
and bringing a surface of the second induction heating plate and the frame adjacent to the surface
of the first induction heating plate inductively heats the electrically conductive sheet when ac
currents flow through the one or more first, second and third induction coils; and whereby
removing the second induction heating plate provides an area over the electrically conductive
15 sheet into which a liquid bonding material can be poured and contained by the frame as the liquid
bonding material cools and bonds with the electrically conductive sheet.

2. A method of producing a bonded product by induction heating, the method comprising the
steps of:

placing an electrically conductive sheet between a first induction heating plate and a
20 second induction heating plate disposed within a frame;

supplying ac current to one or more induction heating coils in the first induction heating
plate, the second induction heating plate and the frame to establish magnetic fields that couple
with the electrically conductive sheet to inductively heat the sheet;

moving the second induction heating plate away from the electrically conductive sheet;

25 pouring a liquid bonding material over the electrically conductive sheet; and

containing the liquid bonding material over the electrically conductive sheet within the
frame.

3. The method of claim 2 further comprising the step of quenching the liquid bonding material
over the electrically conductive sheet.

30 4. The method of claim 2 wherein the electrically conductive sheet is a steel composition and
the liquid bonding material comprises a molten composition of a copper or aluminum alloy.

5. An induction bonding apparatus comprising:

a first induction heating plate comprising one or more first induction coils disposed within

a heat resistant material, the first induction heating plate having an indentation therein;

a second induction heating plate comprising one or more second induction coils disposed within a heat resistant material; and

a frame disposed around the second induction heating plate, the frame comprising one or more third induction heating coils disposed within a heat resistant material;

whereby placing an electrically conductive sheet on a surface of the first induction heating plate and bringing a surface of the second induction heating plate and the frame adjacent to the surface of the first induction heating plate inductively heats the electrically conductive sheet when ac currents flow through the one or more first, second and third induction coils; and whereby

pressing the electrically conductive sheet with the second induction heating plate into the indentation creates a contained area above the surface of the electrically conductive sheet in the indentation into which a liquid bonding material can be poured and contained as the liquid bonding material cools and bonds with the electrically conductive sheet.

6. A method of producing a bonded product by induction heating, the method comprising the steps of:

placing an electrically conductive sheet between a first induction heating plate and a second induction heating plate disposed within a frame;

supplying ac current to one or more induction heating coils in the first induction heating plate, the second induction heating plate and the frame to establish magnetic fields that couple with the electrically conductive sheet to inductively heat the sheet;

pressing the electrically conductive sheet into an indentation in the first induction heating plate with the second induction heating plate;

moving the second induction heating plate away from the electrically conductive sheet; and

pouring a liquid bonding material into the indentation over the electrically conductive sheet.

7. The method of claim 6 further comprising the step of quenching the liquid bonding material over the electrically conductive sheet.

8. The method of claim 6 wherein the electrically conductive sheet is a steel composition and the liquid bonding material comprises a molten composition of a copper or aluminum alloy.

9. An induction bonding apparatus comprising:

a first heat resistant plate having an indentation for insertion of an electrically conductive sheet;

a second heat resistant plate for placement over the first heat resistant plate; and
an induction coil assembly;

whereby an electrically conductive sheet inserted in the indentation and substantially enclosed by the first and second heat resistant plates is inserted into the induction coil assembly to inductively
5 heat the electrically conductive sheet when ac current flows through the induction coil assembly; and whereby removing the substantially enclosed electrically conductive sheet from the induction coil assembly, and removing the second heat resistant plate provides an area over the electrically conductive sheet into which a liquid bonding material can be poured and contained as the liquid bonding material cools and bonds with the electrically conductive sheet.

10 10. The apparatus of claim 9 wherein the induction coil assembly comprises a solenoidal coil,

11. A method of producing a bonded product by induction heating, the method comprising the steps of:

placing an electrically conductive sheet in an indentation in a first heat resistant plate;

covering the first heat resistant plate with a second heat resistant plate;

15 placing the substantially enclosed electrically conductive sheet in an induction coil assembly;

supplying ac current to the induction coil assembly to establish a magnetic field that couples with the electrically conductive sheet to inductively heat the sheet;

removing the enclosed electrically conductive sheet from the induction coil assembly;

20 removing the second heat resistant plate from the first heat resistant plate; and

pouring a liquid bonding material over the electrically conductive sheet in the indentation.

12. The method of claim 11 further comprising the step of quenching the liquid bonding material over the electrically conductive sheet.

13. The method of claim 11 wherein the electrically conductive sheet is a steel composition and
25 the liquid bonding material comprises a molten composition of a copper or aluminum alloy.